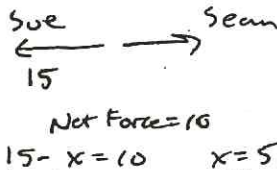


Practice Physics Final Exam - Standards 25-37

- 1) A child's toy is suspended from the ceiling by means of a string. The Earth pulls downward on the toy with its weight force of 8.0 N. If this is the "action force," what is the "reaction force?" 1) A
- A. The toy pulling upward on the Earth with an 8.0-N force.  
 B. The ceiling pulling upward on the string with an 8.0-N force.  
 C. The string pulling downward on the ceiling with an 8.0-N force.  
 D. The string pulling upward on the toy with an 8.0-N force.
- Newton's 3rd Law  
Every action has an equal but opposite reaction.*
- 2) If you exert a force F on an object, the force which the object exerts on you will 2) J
- F. depend on whether or not the object is moving.  
 G. depend on the relative masses of you and the object.  
 H. depend on whether or not you are moving.  
 J. always be F.
- Newton's 3rd Law.  
Every action has an equal but opposite reaction.*
- 3) You are standing in a moving bus, facing forward, and you suddenly fall forward. You can imply from this that the bus's 3) A
- A. velocity decreased.  
 B. speed remained the same, but it's turning to the right.  
 C. speed remained the same, but it's turning to the left.  
 D. velocity increased.
- Your inertia continues to cause your body to travel forward even when bus slows down. Newton's 1st Law.*
- 4) A 10-kg box sitting on a horizontal surface is pulled by a 5.0-N force. A 3.0-N friction force retards the motion. What is the acceleration of the object? 4) J
- F. 0.30 m/s<sup>2</sup>  
 G. 0.50 m/s<sup>2</sup>  
 H. 5.0 m/s<sup>2</sup>  
 J. 0.20 m/s<sup>2</sup>
- 3N ← □ → 5N*  
*Net force 5-3 = 2N*  
 $F = ma$   
 $\frac{2}{10} = \frac{(10)}{10} a$   
 $.2 \text{ m/s}^2 = a$
- 5) Which of Newton's laws best explains why motorists should buckle-up? 5) B
- A. the law of gravitation  
 B. the first law  
 C. the second law  
 D. the third law
- Object in motion will stay in motion unless acted upon by an outside force.*
- 6) An object of mass m sits on a flat table. The Earth pulls on this object with force mg, which we will call the action force. What is the reaction force? 6) F
- F. The object pulling upward on the Earth with force mg.  
 G. The table pushing up on the object with force mg.  
 H. The object pushing down on the table with force mg.  
 J. The table pushing down on the floor with force mg.
- Newton's 3rd Law.  
Every action has an equal but opposite reaction.*
- 7) An object sits on a frictionless surface. A 16-N force is applied to the object, and it accelerates at 2.0 m/s<sup>2</sup>. What is the mass of the object? 7) A
- A. 8.0 kg  
 B. 32 kg  
 C. 78 N  
 D. 4.0 kg
- $F = ma$   
 $\frac{16}{(2)} = \frac{m}{(2)}$   
 $8 \text{ kg} = m$

8) Sue and Sean are having a tug-of-war by pulling on opposite ends of a 5.0-kg rope. Sue pulls with a 15-N force. What is Sean's force if the rope accelerates toward Sue at  $2.0 \text{ m/s}^2$ ? 8) F

- F. 5.0 N
- G. 50 N
- H. 25 N
- J. 3.0 N



$F = ma$   
 $F = (5)(2)$   
 $F = 10 \text{ N}$

9) A net force  $F$  accelerates a mass  $m$  with an acceleration  $a$ . If the same net force is applied to mass  $2m$ , then the acceleration will be 9) D

- A.  $2a$ .
- B.  $a/4$ .
- C.  $4a$ .
- D.  $a/2$ .

$F = ma$   
*Double the mass, half the acceleration.*

10) A stone is thrown straight up. At the top of its path, the net force acting on it is 10) H

- F. greater than zero, but less than its weight.
- G. greater than its weight.
- H. equal to its weight.
- J. instantaneously equal to zero.

*Force of gravity always acting on the object.*

11) A constant net force acts on an object. Describe the motion of the object. 11) B

- A. constant velocity
- B. constant acceleration
- C. constant speed
- D. increasing acceleration

$F = ma$   
*a constant force will result in a constant acceleration if mass stays constant.*

12) Two cars collide head-on. At every moment during the collision, the magnitude of the force the first car exerts on the second is exactly equal to the magnitude of the force the second car exerts on the first. This is an example of 12) G

- F. Newton's law of gravitation.
- G. Newton's third law.
- H. Newton's first law.
- J. Newton's second law.

*Newton's 3rd law*  
*Every action has an equal but opposite reaction.*

13) An example of a force which acts at a distance is 13) A

- A. weight.
- B. tension.
- C. kinetic friction.
- D. static friction.

*Force of gravity does not need to touch an object to affect it. Acts at a distance.*

14) The acceleration due to gravity is lower on the Moon than on Earth. Which of the following is true about the mass and weight of an astronaut on the Moon's surface, compared to Earth? 14) J

- F. Mass is less, weight is same.
- G. Both mass and weight are the same.
- H. Both mass and weight are less.
- J. Mass is same, weight is less.

*No matter where you go your mass stays the same but your weight depends on the planet/moon you are on.*

15) A 20-N weight and a 5.0-N weight are dropped simultaneously from the same height. Ignore air resistance. Compare their accelerations. 15) A

- A. They both accelerate at the same rate because they have the same weight to mass ratio.
  - B. The 20 N weight accelerates faster because it has more inertia.
  - C. The 20 N weight accelerates faster because it is heavier.
  - D. The 5.0 N weight accelerates faster because it has a smaller mass.
- The acceleration due to gravity is the same on all objects. Doesn't discriminate.

16) A horizontal force accelerates a box from rest across a horizontal surface (friction is present) at a constant rate. The experiment is repeated, and all conditions remain the same with the exception that the horizontal force is doubled. What happens to the box's acceleration? 16) G

- F. It increases somewhat.
  - G. It increases to exactly double its original value.
  - H. It increases to more than double its original value.
  - J. It increases to less than double its original value.
- $F = ma$   
Double the force, double the acceleration.

17) In the absence of an external force, a moving object will 17) D

- A. stop immediately.
  - B. slow down and eventually come to a stop.
  - C. go faster and faster.
  - D. move with constant velocity.
- Newton's 1st Law.  
Object in motion stays in motion with a constant velocity unless acted upon by an outside force.

18) What is the mass of an object that weighs 250 N on the surface of the Earth where the acceleration due to gravity is  $9.80 \text{ m/s}^2$ ? 18) H

- F. 2,450 kg
- G. 24.5 kg
- H. 25.5 kg
- J. 250 kg

$$F = ma$$

$$\frac{250}{(9.8)} = \frac{m}{(9.8)}$$

$$\boxed{25.5 \text{ kg} = m}$$

19) A horizontal force of 5.0 N accelerates a 4.0-kg mass, from rest, at a rate of  $0.50 \text{ m/s}^2$  in the positive direction. What friction force acts on the mass? 19) B

- A. 2.0 N
- B. 3.0 N
- C. 4.0 N
- D. 5.0 N

$$F = ma$$

$$F = (4)(0.5)$$

$$F = 2 \text{ N} \leftarrow \text{this is net force}$$

$$F_{\text{net}} = F_{\text{app}} - F_{\text{fric}}$$

$$2 = 5 - F_{\text{fric}}$$

$$\boxed{F_{\text{fric}} = 3 \text{ N}}$$

20) A rocket moves through empty space in a straight line with constant speed. It is far from the gravitational effect of any star or planet. Under these conditions, the force that must be applied to the rocket in order to sustain its motion is 20) H

- F. equal to its mass.
  - G. dependent on how fast it is moving.
  - H. zero.
  - J. equal to its weight.
- Newton's 1st Law.  
Object in motion stays in motion with a constant velocity unless acted upon by an outside force.

21) Starting from rest, a 4.0-kg body reaches a speed of 8.0 m/s in 2.0 s. What is the net force acting on the body? 21) A

- A. 16 N
- B. 32 N
- C. 8.0 N
- D. 4.0 N

$$v_2 = v_1 + at$$

$$8 = 0 + a(2)$$

$$4 \text{ m/s}^2 = a$$

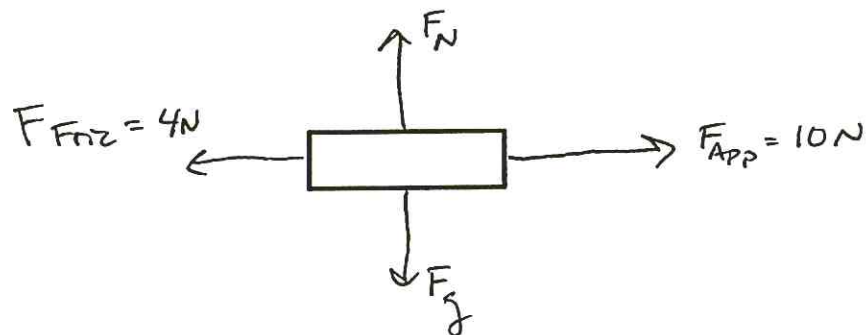
$$F = ma$$

$$F = (4)(4)$$

$$F = 16 \text{ N}$$

22. A hand applies an eastward force of 10 Newtons to a 2.5 kg book and slides it across a horizontal table. If there is a frictional force of 4 Newtons acting on the book while it slides...

a) Draw a free body diagram of all the forces acting on the book.



b) Based on your diagram, what is the net force acting on the book?

$$F_{\text{Net}} = F_{\text{App}} - F_{\text{fric}}$$

$$F_{\text{Net}} = 10 - 4$$

$$F_{\text{Net}} = 6 \text{ N East}$$

c) What is the acceleration of the book?

Express your final answer in  $\text{m/s}^2$ . Show all of your work for full credit.

What do you know?	$F = 6 \text{ N}$ $m = 2.5 \text{ kg}$ $a = ?$
What formula?	$F = m a$
Substitute in values	$6 = (2.5) a$
Calculations	$\frac{6}{(2.5)} = \frac{(2.5)a}{(2.5)}$
Answer	$a = 2.4 \text{ m/s}^2 \text{ Eastward}$